

## REMARKS

### **INTRODUCTION:**

In accordance with the foregoing, claim 16 is added. No new matter is added. Claims 1 and 3-15 are pending and under consideration. Reconsideration is respectfully requested.

### **REJECTION UNDER 35 U.S.C. §102:**

Claim 15 was allegedly rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent No. 6813021 B2 to Chung et al. (hereinafter "Chung").

Cheung discloses a method for monitoring an optical signal-to-noise ratio in which an arbitrarily polarized optical signal including an unpolarized ASE noise is inputted to a rotating quarter-wave plate and then to a rotating linear polarizer so that a maximum power and a minimum power of the signal outputted from the rotating linear polarizer can be detected. (See Cheung's Abstract.) In Cheung, the signal to noise ratio (SNR) is calculated from the measured value corresponding to the degree of polarization, but the method does not determine "**a change amount** in the signal to noise ratio of the optical signal based on a measured value of a degree of polarization of said optical signal" (emphasis ours for the different quantity determined therein) as recited in claim 15.

In general, multiple causes may determine change of the degree of polarization (DOP) of an optical signal transmitted along an optical fiber: the change in the signal to noise ratio (SNR), the change of the polarization-mode dispersion (PMD) or a polarization dependent loss (PDL) in a transmission path. Therefore, an absolute value of the SNR can be determined from measuring the DOP only if the PDM and the PDL are absent. However, in an actual transmission path, the PDM or PDL are not absent, so it is difficult to determine the absolute value of the optical SNR from the measured value of the DOP.

Based on the fact that the rate of change in the DOP due to SNR is different from a rate of change in the DOP caused by changes of PMD and PDL, for an appropriately selected time interval T it is possible to determine the change in the SNR based on the change in DOP. (See, for example, paragraph [0062] of the specification in the U.S. Application Publication No. 2004/0067057.) Therefore, the claims are different from all the cited prior art references.

Cheung uses two measurements, a maximum power and a minimum power of a sum of a polarized signal and unpolarized noise, to determine the SNR. That is, Cheung method (1) requires a time interval during which the signal to be maintained the same so the maximum and respectively minimum power are determined while the quarter-wave plate and the linear polarizer rotate, and (2) operates under the assumption that the noise is unpolarized.

In contrast, the method recited in claim 15, allows monitoring the SNR (which is not maintained to the same value in order to be calculated) by determining a change in the SNR based on a measured value of a degree of polarization. In other words, according to claim 15, instead of determining an absolute value of the SNR, a change of the SNR is determined.

Therefore, claim 15 patentably distinguishes over Cheung at least by reciting "determining a change amount in the signal to noise ratio of the optical signal based on a measured value of a degree of polarization of said optical signal."

**REJECTION UNDER 35 U.S.C. §103:**

Claims 1, 3-6, 12, and 15 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 6,859,268 to Chou et al. ("Chou"), in view of the article "PMD-induced BER penalties in optically amplified IM/DD lightwave systems", Electronics Letters, 12 May 1994 vol. 30, iss. 10 to Morkel ("Morkel"). Claims 7-10 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Chou in view of Morkel and further in view of U.S. Patent No. 6,512,612 to Fatehi et al. ("Fatehi"). Claim 11 is rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Chou in view of Morkel, and Fatehi, and further in view of U.S. Patent No. 6,154,273 A to Suzuki ("Suzuki"). Claims 13 and 14 are rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Chou in view of Morkel, and further in view of U.S. Patent No. 6,885,820 to Eder et al. ("Eder").

Independent claim 1 patentably distinguishes over the combination of Chou and Morkel at least by reciting "determining a change amount in an optical signal to noise ratio of said optical signal according to a change amount in a measured value of said degree of polarization relative to said stored initial value."

As discussed above, both changes in the SNR and changes of the PMD may determine change of the DOP. In other words DOP is a multivariable function. Morkel focuses on the relationship between SNR and PMD, while claim 1 refers to "determining a change amount in an

optical signal to noise ratio of said optical signal according to a change amount in a measured value of said degree of polarization relative to said stored initial value", that is based on the relationship between the SNR and POD.

Chou teaches in col. 9, lines 10-35 that a calculated DOP is stored in a memory and fit by linear-least square to determine a maximum DOP. Then a state of polarization (SOP) vector on Poincare sphere is located using the maximum DOP. Chou's approach does not anticipate or render obvious "determining a change amount in an optical signal to noise ratio of said optical signal according to a change amount in a measured value of said degree of polarization relative to said stored initial value" as recited in claim 1.

In view of the above, Applicants believe that Chou and Morkel, alone or in combination, do not render obvious the features of amended claim 1. Therefore, claim 1 and claim 3 depending from claim 1 are patentable.

Fatehi, Suzuki, and Eder do not correct or compensate for the above identified failure of Chou and Morkel in rendering obvious the features recited in the independent claims.

Independent claim 4 patentably distinguishes over the cited prior art at least by reciting "determines a change amount in an optical signal to noise ratio of said optical signal according to a change amount in a measured value of the degree of polarization obtained in said degree of polarization measuring section relative to said stored initial value." Claims 5-11, 13 and 14 depending directly or indirectly from claim 4 patentably distinguish over the cited prior art at least by inheriting patentable features from claim 4.

Independent claim 12 patentably distinguishes over the cited prior art at least by reciting "an optical signal to noise ratio calculation section which determines a change amount in an optical signal to noise ratio of said optical signal, by using the measured value of the degree of polarization obtained by the degree of polarization measuring device in said automatic polarization mode dispersion compensation apparatus."

Independent claim 15 patentably distinguishes over the cited prior art at least by reciting "determining a change amount in the signal to noise ratio of the optical signal based on a measured value of a degree of polarization of said optical signal."

**NEW CLAIM 16**

New claim 16 is a method of monitoring a signal to noise ratio of a signal transmitted via an optical fiber. The claim is fully supported by the originally filed specification, for example FIG. 12 and the corresponding description. Claim 16 patentably distinguishes over the prior art at least by reciting "measuring a degree of polarization of the part of the signal and comparing the measured degree of polarization with a reference value of the degree of polarization to monitor a change of the signal to noise ratio, wherein if the measured degree of polarization exceeds the reference value, the reference value is set equal to the measured degree of polarization."

**CONCLUSION:**

In accordance with the foregoing, it is respectfully submitted that all outstanding objections and rejections have been overcome and/or rendered moot. And further, that all pending claims patentably distinguish over the prior art. Thus, there being no further outstanding objections or rejections, the application is submitted as being in condition for allowance which action is earnestly solicited.

If the Examiner has any remaining issues to be addressed, it is believed that prosecution can be expedited by the Examiner contacting the undersigned attorney for a telephone interview to discuss resolution of such issues.

If there are any underpayments or overpayments of fees associated with the filing of this Amendment, please charge and/or credit the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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